NEW MINERAL NAMES

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Vysotskite

A. D. GENKIN AND O. E. ZVYZGINTSEV, Vysotskite, a new sulfide of palladium and nickel. *Zapiski Vses. Mineralog. Obshch.* **91,** 718–725 (1962) (in Russian).

A preliminary description of this mineral had previously been published (see Mineral No. 8, *Am. Mineral.* **46,** 464, 1961). The mineral occurs in the Norilsk deposits intergrown with chalcopyrite, pyrite and millerite. Samples were treated with HNO_3 and HF to get a concentrate of vysotskite+cooperite, and the latter was removed by picking under the binoculars. Analyses, made by T. P. Solov on 30 mg, gave Pd 61.9, 57.1; Pt 4.13, 5.50; Ni 14.18, 14.18; S (diff) 19.79, 23.22%, corresponding to Pd:Ni:Pt=0.68:0.29:0.03. The metal:S ratio is 1.4 and 1.1. Confirmatory microspectrographic analysis by I. V. Murav'eva gave Pd 57.6, Pt 4.4, Ni 16.6, S 21.4%. The formula is therefore (Pd, Ni)S. The mineral is not etched by the usual reagents, including aqua regia. *X*-ray powder data (46 lines) are given; they resemble those for braggite and synthetic PdS and are indexed on the basis of the cell for PdS. The latter has space group $P4_2/m$ or $P4_2$, with 8 formula weights in the unit cell. The data for vysotskite give a 6.371±.004, c 6.540±0.007Å. G calc. from *x*-ray data 6.4, measured on 30 mg 8.4. The strongest lines are 2.91 (10)(102); 2.86 (10)(210, 201); 1.031 (9)(611); 2.61 (8) (211); 1.717 (8)(312); 1.185 (8)(502, 432); 2.64 (7)(112); 1.859 (7)(222); 1.138 (7)(404); 2.15 (6)(212); 1.732 (6)(213); 1.419 (6)(214); 1.396 (6) (412); 1.121 (6)(414); 1.071 (6)(106, 424).

Vysotskite occurs mainly as minute irregular deposits, rarely as well-formed prismatic crystals up to 0.07 mm. Color silvery with strong metallic luster. In reflected light grayish-white with a blue tint, reflecting power low, about 44–45%. Anisotropic under crossed nicols with bluish to brownish color effects. Birefringence apparent only in immersion, color grayish-blue to grayish-lilac. Hardness rather high, but the mineral is marked by a steel needle. Polishes well.

Vysotskite occurs in disseminated ores in andesine diabases the northern part of the deposit, associated with chalocopyrite, millerite (very rare elsewhere in the deposit), nickelian pyrite, linneite and cooperite. It was formed in a late stage.

The name is for the Soviet geologist, N. K. Vysotskii, who first found platinum metals at Norilsk.

Kalistrontite

M. L. VORONOVA, Kalistrontite, a new potassium strontium sulfate. *Zapiski Vses. Mineralog. Obshch.* **91,** 712–717 (1962) (in Russian).

Analysis by K. A. Baklanova gave K_2O 19.22, Na_2O 4.15, CaO 5.15, SrO 23.20, MgO 0.13, SO_3 45.45, Cl 1.56, H_2O 0.90, R_2O_3 0.02, insol. 0.07, sum 99.85%$-$(O=Cl_2)0.35 =99.50%. Spectrographic analysis showed Si 0.3-1.0, Al 0.03-0.1, Fe 0.1-0.3, Mn 0.003-0.01, Sn 0.01-0.03, Ba 0.3%. After deducting halite and anhydrite, the analysis corresponds to $K_2Sr(SO_4)_2$. The mineral is insoluble in water, dissolves in HCl when heated, with separation of $SrSO_4$. DTA study by V. P. Ivanova showed an endothermal effect at 634°.

Laue and rotation study by A. I. Komkov showed the mineral to be trigonal, with a 5.45±0.03, c 20.7±0.1 kX. The unit cell contains $3(K_2Sr(SO_4)_2)$. The mineral is isostructural with palmierite, $(K, Na)_2$ Pb $(SO_4)_2$. Indexed *x*-ray power diagrams are given. The strongest lines are 3.12, 3.14 (10)$(10\bar{1}5)$; 1.904, 1.904 (9, 7)$(10\bar{1}.10)$; 2.73, 2.73 (8, 6) $(11\bar{2}0)$; 1.236 (8), 1.238 (5)$(22\bar{4}7)$; 1.041 (7), (1.042)(3b)$(31\bar{4}.12)$; 2.06 (6), 2.05 (5)$(20\bar{2}5)$; 1.109, 1.109 (6, 2b) $(31\bar{4}.10)$.

Kalistrontite is colorless, transparent, luster vitreous. Cleavage {0001} perfect. The mineral is brittle and is easily split by pressing with a needle. Hardness 2, G 3.20 (measured), 3.32 (calc. from x-ray data). Optically uniaxial (−) with α 1.549, γ 1.569, both ±0.002.

The mineral occurs as single crystals, elongated along the prism, up to 15–20 mm long and as flattened hexagonal tablets up to 22 mm in diameter, in saline anhydrite containing clay and dolomite and a little sylvite. It was found in a drill core from a depth of 447 m near Alshtan, Bachkir Autonomous S.S.R. It was probably formed by reaction of sylvite with solutions containing Sr.

The name is for the composition.

Pravdite

A. N. NURL'BAEV, Pravdite, a new rare-earth mineral. *Doklady Akad. Nauk S.S.S.R.* **147,** 689–691 (1962) (in Russian).

Analysis by M. P. Dedeshko and N. G. Syromyatnikov gave SiO_2 18.84, P_2O_5 3.09, Al_2O_3 35.70, Fe_2O_3 1.84, ThO_2 4.90, VO_2 0.194, RE_2O_3 18.40, CaO 15.84, Na_2O 0.24, K_2O 0.57, sum 99.61% (given as 99.57). Spectrographic analysis showed Pb 0.1% Be 0.0007%. Spectrographic analysis by S. K. Kalinin of the rare earths showed Ce predominant (>10), La 5, Nd 3-4, Sm 0.3, Gd 0.01, Y 0.1%. The formula is $4CaO \cdot RE_2O_3 \cdot 5Al_2O_3 \cdot 5SiO_2$. The DTA curve shows a strong endothermal effect at 215° and a weak one at 450° and an exothermal effect at 770°. The mineral is slightly soluble in HCl, HNO_3 or H_2SO_4, with the formation of an orange-yellow precipitate.

X-ray study showed the mineral to be amorphous, metamict. It gave no pattern when heated to 200°, 400° and 600°, but gave a pattern (55 lines) after being heated two hours at 850–900°. The strongest lines are 2.871 (10), 1.974 (9), 1.6625 (9), 1.1198 (9), 3.13 (8), 14.79 (7), 1.8803 (7), 1.2596 (7), 10.88 (6), 3.51 (6), 1.9497 (6), 1.2345 (6). Many of these lines are close to strong lines on the patterns of the heated thorium silicates smirnovskite and karnasurtite, but many lines do not correspond.

The mineral is honey-yellow (in fine particles) to dark-brown or chocolate-brown. Luster vitreous. Microhardness 705.1 kg/sq mm, which equals 6.2 on the Khrushchev scale. G (by suspension) 4.40–4.48. Brittle with irregular fracture, no cleavage. Isotropic, n 1.757–1.760. The mineral does not luminesce, but secondary alteration products luminesce bright green.

The mineral occurs in irregular masses ranging from a few mm to 5–7 cm in biotite-nepheline syenite pegmatites of the Ishim complex, Central Kazakhstan.

The name is for the newspaper Pravda, central organ of the Communist Party, Soviet Union.

DISCUSSION.—Differs from other thorium silicates in the very high aluminum content. This is, as far as I know, the first mineral to be named for a newspaper; let us hope it is the last.

Biringuccite (Hoeferite), Nasinite

CURZIO CIPRIANI AND PIERO VANNUCCINI. *Hoeferite e Nasinite: due nuovi borati fra i prodotti di Lardarello. Pt. I. Atti accad. nazl. Lincei, Rend. classe sci. fis., mat. et nat.* **30,** 74–83 (1961).

CURZIO CIPRIANI. Pt. II. *Ibid.*, 235–245.

CURZIO CIPRIANI. A proposito del nome del borato naturale $2Na_2O \cdot 5B_2O_3 \cdot 4H_2O$ di Lardarello. *Atti accad. nazl. Lincei, Rend. classe sci. fis., mat. e nat.* **31,** 141–142 (1961).

Originally considered to be a single mineral species (CURZIO CIPRIANI. Un nuovo borato a Lardarello (abs.). *Soc. mineralog. ital. Rend.* **15,** 344, 1959); now found to be a mixture of two new hydrous sodium borates. The minerals occur as incrustations on tubing of the "Hole of the Storehouse" drilled in 1927 at Lardarello, Tuscany, Italy. The earthy mass of irregular form and variable color (orange yellow to light gray) consists of a mechanically inseparable mixture of the new borates, thenardite, orpiment and minor silicates. Analysis of the whole sample containing the least impurities gave SiO_2 1.91, (Al_2O_3, Fe_2O_3) 0.75, CaO 0.36, Na_2O 20.53, K_2O 1.07, As_2O_3 3.72, B_2O_3 46.54, SO_3 4.94, S 1.26, Cl 0.18, H_2O^- 10.98, H_2O^+7.79, oxygen correction for (S, Cl) 0.67, sum 99.36%.

Two new hydrous sodium borates *A* and *B* were synthesized and are shown by optical properties, *x*-ray data and DTA study to be identical with the two natural borates. Syntheses were carried out at various temperatures and various $Na_2O:B_2O_3$ ratios in an autoclave since it was found that the naturally occurring borates could not be synthesized at atmospheric pressure. Solid phases formed were tincalconite, borax, sborgite, possible ezcurrite, sassolite and borates *A* and *B*. Borate *A* formed at temperatures from 150° to 250° C. and at $Na_2O:B_2O_3$ ratios of 1:2 to 1:4.5; borate *B* at 100° to 200°C and ratios of 1:2.5 to 1:4. Analysis of *A* gave B_2O_3 64.05, Na_2O 22.83, H_2O 12.68, sum 99.56%; *B* gave B_2O_3 58.43, Na_2O 20.95, H_2O 21.13, sum 100.51%. These correspond to $2Na_20 \cdot 5B_2O_3 \cdot 4H_2O$ and to $2Na_20 \cdot 5B_2O_3 \cdot 7H_2O$ for *A* and *B* respectively.

DTA study of *A* shows endothermal effects at 70°, 130°, 400° and 470°C with fusion at about 650°C indicated by a break in the chart; *B* shows endothermal effects at 70° 130°, 190°, 330°, 400°, a broad exothermal peak with an approximate maximum at 500° and fusion at about 650°C. DTA of the natural borates shows complex combination of these peaks and an additional endothermal effect due to admixed thenardite at 260°C. No data are given for solubility, hardness, specific gravity or color.

Crystals of *A* are tiny laminae or needles with hexagonal cross-section. Good cleavages [001] and [100]. Optically biaxial (−), α1.496, β1.539, γ1.557, all ±0.002; 2V meas. 62.7° ±0.1°, 2V calc. 64.6°. Y is parallel to *b*, $Z \wedge a = 5.4° \pm 0.6°$, elongation positive. Compound *A* is presumed to be monoclinic. Crystals of *B* (also monoclinic) resemble those of *A* but are slightly larger. Optically biaxial (−), α1.494, β1.512, γ1.524; 2V meas. 66.8°±0.7°, 2V calc. 77.4°, elongation positive. Determination of α was difficult due to orientation effects of the crystals and accounts for the disparity between meas. and calc. 2V. Value for α calculated from meas. 2V is 1.485. Y is parallel to *b*, $Z \wedge a = 6.8° \pm 0.1°$. The mixture of two natural minerals consists of tiny birefringent crystals and microcrystalline clusters with indices lying between 1.500 and 1.550. One mineral had β1.538 and γ1.550 (corresponding to *A*) and the other has β1.513 and γ1.523 (*B*).

X-ray patterns of *A* and especially of *B* show strong preferred orientation effects. Strongest of 73 unindexed lines of *A* are 10.32 (10), 3.453 (8), 5.17 (6), 3.049 (5), 2.589 (4); strongest of 65 unindexed lines of *B* are 6.01 (10), 3.006 (5), 5.30 (2) and 2.902 (1). *X*-ray data are given for the natural mixture of borates and show minor lines due to thenardite, orpiment and quartz.

The name proposed originally for the naturally occurring borate identical with *A* was hoeferite in honor of chemist Uberto Francesco Hoefer, who identified boric acid from condensates of the Tuscan soffioni in 1777. This name was changed in the later note to biringuccite, for alchemist Vannoccio Biringuccio (1480–1539), to prevent confusion with hoeferite used as a varietal name for nontronite. The natural borate identical with *B* is named nasinite for chemist Raffaello Nasini (1854–1931).

Discussion.—Both minerals appear to be valid species. Biringuccite, $2Na_2O \cdot 5B_2O_3 \cdot 4H_2O$, has not previously been found as a phase in the system Na_2O-B_2O_3-H_2O. Nasinite which is $2Na_2O \cdot 5B_2O_3 \cdot 7H_2O$ and is monoclinic according to Cipriani is considered by him not to be a dimorph of ezcurrite which is also $2Na_2O \cdot 5B_2O_3 \cdot 7H_2O$ but triclinic (?) according to Muessig and Allen (*Econ. Geol.* **52,** 426–437, 1957). Cipriani, noting the identity between *x*-ray patterns of ezcurrite and "Suhr's borate," $3Na_2O \cdot 8B_2O_3 \cdot 10H_2O$, has analyzed a sample of the latter material (furnished by W. T. Schaller) and obtained B_2O_3 56.95, Na_2O 19.18, H_2O 19.06, NaCl 4.02, sum 99.21%. Based on these data he assigns to ezcurrite the formula $3Na_2O \cdot 8B_2O_3 \cdot 10H_2O$.

Dr. Nelson P. Nies (U. S. Borax Research Corp., Anaheim, Calif.) and R. C. Erd (U. S. Geol. Survey) had independently found that ezcurrite and "Suhr's borate" were identical by *x*-ray and optical study. An unpublished analysis of the latter by Nies shows it to be $2Na_2O \cdot 5.1B_2O_3 \cdot 7H_2O$ which is in close agreement with Muessig and Allen's formula for ezcurrite. They further have found that the *x*-ray pattern for "Auger's borate," $2Na_2O \cdot 5B_2O_3 \cdot 5H_2O$, is identical with the *x*-ray pattern for nasinite given by Cipriani. Further study must be made of the compositions of the synthetic hydrous sodium borates under discussion to establish the correct formulas for nasinite and ezcurrite. A paper giving the results of chemical, *x*-ray, and optical studies on these compounds is being prepared by Nies and Erd.

RICHARD C. ERD

Akaganéite

A. L. MACKAY. β-Ferric oxyhydroxide—akaganéite. *Mineral. Mag.* **33,** 270–280 (1962).

This mineral was named by Dr. M. Nambu of Sendai University, Japan. It was identified by its *x*-ray powder pattern which matches that of synthetic β-FeOOH described by Mackay in 1960 (*Mineral. Mag.* **32,** 545–557).

Two analyses were made by Dr. Nambu, one in 1957 and the other in 1959. The results are, respectively: Fe_2O_3 78.23, 80.98; FeO 0.82, 0.23; SiO_2 3.10, 3.57; Al_2O_3 1.21, 1.40; Na_2O 0.62, 0.82; K_2O 0.19, 0.29; H_2O^+ 10.20, 9.71; H_2O^- 4.96, 2.55; total 99.33, 99.55%. These data correspond approximately to FeOOH (Fe_2O_3 89.90, H_2O 10.10).

Physically, akaganéite resembles "limonite." Electron micrographs indicate that individual crystals are approximately 2500×250 Å. The mineral is best identified by its *x*-ray powder pattern.

Synthetic β-FeOOH is tetragonal, $I4/m$, with $a = 10.48$ Å and $c = 3.023$ Å ($c/a = 0.288$, J.A.M.). These values apparently were confirmed on the natural material. Strongest lines (CoK_α radiation) in the power pattern are: 7.40 (vs), 3.311 (vs), 1.635 (vs), 2.543 (s), 1.438 (s), and 1.944 (ms) all in Å. The structure is that of hollandite and α-MnO_2.

Akaganéite occurs at the Akagané mine, Iwate Prefecture, Japan, where it appears to have formed from pyrrhotite. Also present are: goethite, "ferrous sulphate," and "hydrohematite."

The name is for the mine. The name was approved in advance of publication by the Commission on New Minerals, I.M.A.

J. A. MANDARINO

Garronite

G. P. L. WALKER. Garronite, a new zeolite from Ireland and Iceland. *Mineral. Mag.* **33,** 173–186 (1962).

R. M. BARRER, F. W. BULTITUDE AND I. S. KERR. Some properties of, and a structural scheme for, the harmotome zeolites. *Jour. Chem. Soc.* **294,** 1521–1528 (1959).

This name, applied without description to a probable new species, was reviewed in *Am. Mineral.* **46,** 466 (1961). The full description has now been published.

Analyses by I.S.E. Carmichael of four samples from various localities in Ireland and Iceland gave: SiO_2 43.21, 44.75, 44.96, 45.15; Al_2O_3 24.20, 23.54, 23.61, 23.35; Fe_2O_3 0.02, 0.003, 0.02, 0.02; CaO 10.64, 11.31, 10.52, 10.32; BaO tr, 0.06, 0.14, 0.09; Na_2O 2.94, 1.38, 2.52, 2.96; K_2O 0.54, 0.70, 0.21, 0.16; H_2O 18.62, 18.35, 17.97, 18.74; Total 100.17, 100.09, 99.95, 100.79%. These analyses conform to the formula: $NaCa_{2.5}Al_6Si_{10}O_{32}\cdot 13.5H_2O$.

Garronite occurs as radiating aggregates in amygdules. The color and hardness are not given, but they presumably are similar to those of phillipsite. Distinct crystal faces are absent. Two cleavages at about 90° to each other and parallel to the lengths of the individuals have been observed in some specimens. Garronite amygdules are distinguished from others by the presence of concentric fractures normal to the lengths of the individuals. The specific gravity of garronite varies from 2.13 to 2.17 (suspension).

Optically, garronite varies from uniaxial (+) or (−) to biaxial (+) or (−). In many of the radiating aggregates the individual crystals vary in optical properties from the core to the extremities, sometimes grading into phillipsite. Data for some thirty-odd specimens show the following ranges: n_1(ϵ for uniaxial garronite) = 1.502 to 1.512, n_2(ω for uniaxial garronite) = 1.500 to 1.515, birefringence = 0.001 to 0.004.

No *x*-ray powder data are given in Walker's paper, although two powder photographs are reproduced. *X*-ray data for garronite are presented in the paper by Barrer *et al.* Their data are indexed on a body-centered tetragonal cell with dimensions $a = 10.1$ Å and $c = 9.87$ Å. However, four of the lines are indexed incorrectly. Barrer and Kerr (private communication, 9 January, 1963) informed the abstractor that they have re-examined their data and on the basis of re-indexing, found two possible sets of unit cell parameters $a = 10.18$, $c = 9.88$, $c/a = 0.9705$ or $a = 9.90$, $c = 10.17$, $c/a = 1.027$. The latter set yields calculated d spacings which better fit the observed d spacings. At the present time, the space group of garronite is not known. Barrer *et al.* hope to undertake a single-crystal study soon. Strongest lines (CuK_α radiation) in the powder pattern are: 4.12 (s), 3.14(s), 2.66(s), 7.15(ms), 4.95(ms), 4.07(m) and 3.22 (m). The patterns of garronite are similar to those of phillipsite and gismondine.

Garronite occurs as amygdule fillings in the Tertiary basalts of eastern Antrim, Ireland (10 localities) and eastern Iceland (22 localities). Other zeolites are present such as: chabazite, thomsonite, levyne, natrolite, phillipsite, heulandite and mesolite.

Garronite is named for the Garron Plateau area of Antrim where it was first found. The type locality is on the western side of Glenariff valley. Walker points out that the same name was applied in 1937 by D. L. Reynolds to "... a rock variously described as an augite-biotite-diorite, a hybrid sodi-potassic gabbro, a gabbro-diorite, and a biotite-essexite-gabbro." Apparently, the petrological usage has not been accepted generally.

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